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May 29, 1974

Memo to: Tom McCann, Stew Messman

From: Grover Scott Jeane II

Subject: Nooksack River Survey near Ferndale, WA.

The water monitoring section of Tech Services has sampled two stations (01A050 and 01A070) on the Nooksack River since October, 1973 (see Figure 1). These stations are sampled twice monthly during water year 1974.

High coliform bacteria concentrations were measured at station 01A050 located 2.3 miles downstream from the City of Ferndale. Samples collected the same day at station 01A070, 0.7 miles above Ferndale, exhibited values 25 times lower. Possible sources of contamination are the City of Ferndale's storm sewers, several small food processing companies, the Ferndale STP and pastured animals adjacent to the river.

A study was initiated to determine the exact source. I established six additional stations between 01A050 and 01A070 (see Figure 1). Station #2 was located immediately above Ferndale. Station #3 and #4 were above and below the Ferndale sewage treatment plant discharge respectively. The remaining stations were located between Station #4 and 01A050. The 8 receiving water stations were sampled on February 20 and February 21, 1974. A composite sample of the STP effluent including three bacteria samples were also collected each study day.

The water monitoring section's bacteria data to date is portrayed in Table #1, along with rainfall and fecal coliform to fecal streptococci ratios (fc/fs). The highest total coliform values were measured at times when the rainfall was not heavy. The dates October 24, 1973, and January 15, 1974, had the highest rainfall but the bacteria increase from the upstream station to the downstream station was minor and could easily be due to surface runoff. The high bacteria counts during times of low runoff indicate a discharge of concentrated bacteria.

In February, 1974, additional bacteria analysis for fecal coliform and fecal streptococci was initiated enabling the computation of fc/fs ratios. The fc/fs ratio values for both stations listed in Table 1 are indicative of a mixture of human and non-human bacteria.

Extremely high bacteria values were not observed during our two day intensive survey (see Table 2). The water quality parameters measured did not reveal any significant sources of contamination. The samples collected at the Ferndale STP are listed in Tables 3 and 4. Inconsistent operation of the plants chlorinator was revealed in erratic chlorine residuals and bacteria levels.

An STP efficiency study was completed on November 28, 1973 (see attached report). The bacteria levels measured during this survey were consistently above 40,000 total coliform colonies per 100 ml. Bacteria samples collected at station 01A050 on November 20, 1973, and December 4, 1973, were in violation of water quality standards.

The above data indicate the most probable source of the bacteria contamination at station 01A050 is the Ferndale sewage treatment plant. The cause of the water quality violations is poor operation of the plant's disinfectant facilities.

GSJ:jmh

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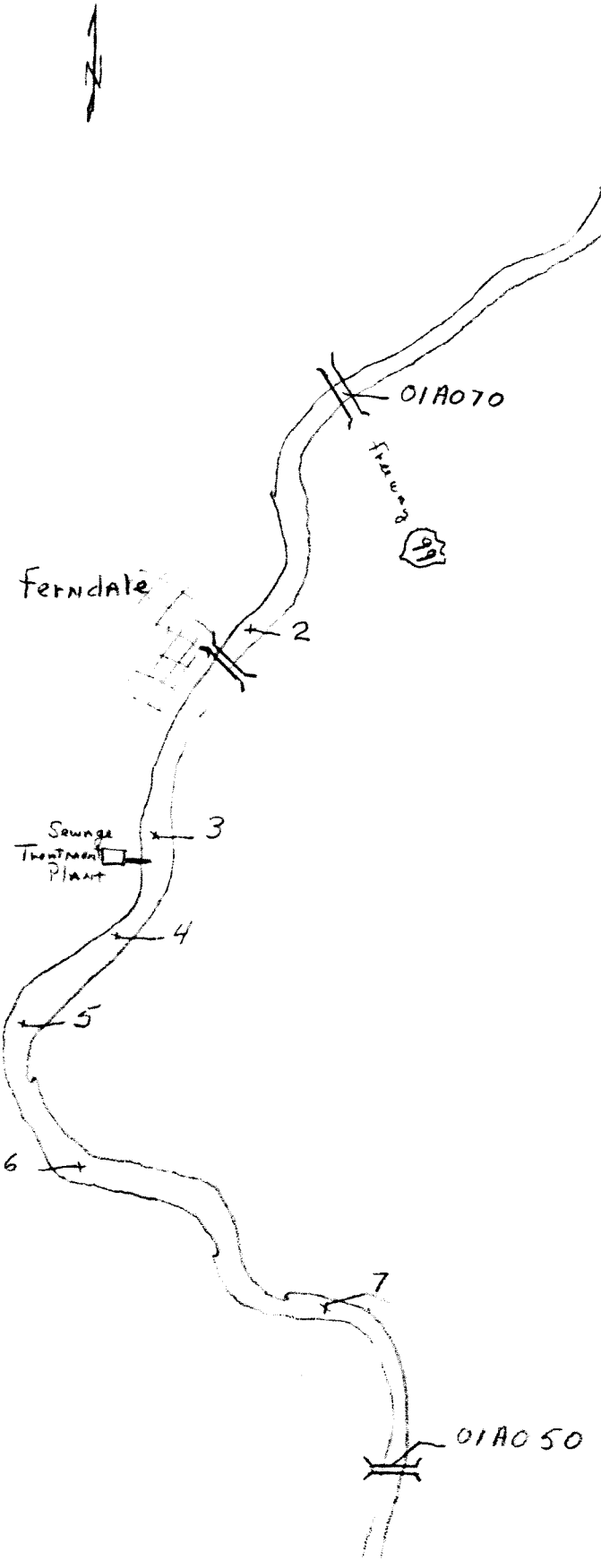
Figure 1 Nooksack River Survey Station Locations, February, 1974.



State of Washington Department of Ecology

Table 1 Nooksack River Survey Data, October, 1973, to April, 1974.

		Station #01A070 (Upstream)				Station #01A050 (Downstream)			
Date	Rainfall*	T.Coliform	F.Coliform	F.Strep	FC/FS**	T.Coliform	F.Coliform	F.Strep	FC/FS**
10-2-73	0.01 in	6,600				6,400			
10-24-73	0.72	4,300				10,000			
11-6-73	0.12	>1,000				26,000			
11-20-73	0.40	1,000				25,000			
12-4-73	0.21	540				20,000			
12-19-73	0.10	820				6,400			
1-15-74	1.51	11,000				14,000			
1-29-74	0.41	2,300				2,000			
2-12-74	N/A	260	100	20	5.0	580	120	20	6.0
2-26-74	N/A	1,200	160	120	1.3	1,200	90	60	1.5
3-12-74	N/A	440	30	18	1.7	270	40	10	4.0
3-26-74	N/A	400	35	15	2.3	550	30	60	0.5
4-9-74	N/A	380	16	8	2.0	560	15	40	0.4
4-23-74	N/A	580	N/A	40	N/A	440	7 App.	30	0.2

* = Total precipitation for day of survey and two immediately previous days.

** = Fecal Coliform to Fecal Streptococci ratio.

N/A = Not Available at time of the report.

Table 2 Nooksack River Survey Data, February, 1974.
Sample Depth = Surface

Date		Station 01A070	2	3	4	5	6	7	01A050
2-20-74	T.Coliform	950	1,600	950	1,000	1,800	700*	1,000	650*
"	F.Coliform	35*	40*	40*	45*	45*	55*	65*	20*
"	F.Strep	10*	10*	5*	<5	5*	5*	5*	15
2-21-74	T.Coliform	1,200	1,400	1,600	710	1,600	1,200	500	650
"	F.Coliform	60*	200	360	130	220	110	60	20*

All bacterial values in colonies/100 ml.
* = Estimated by laboratory.

Table 3 Ferndale Sewage Treatment Plant performance data, February, 1974.

Date		BOD	COD	T.S.S.
2-20-74	Composite Effluent	<20	83	40
2-21-74	" "	<20	83	43

All values in mg/l.

Table 4 Ferndale Sewage Treatment Plant Bacteria Data.

Date 2-20-74				Date 2-21-74			
Time	3 Min Cl_2 Residual	T.Coliform	F.Coliform	F.Strep	Time	3 Min Cl_2 Residual	T.Coliform	F.Coliform
0910	1.0	80*	<5	<5	1030	0.4	11,000	10*
1100	0.75	300*	<5	15*	1200	0.3	>40,000	60
1230	---	1,600*	<5	10*	1300	0.15	>40,000	100

All bacteria values in colonies/100 ml.
All other values in mg/l.
* = Estimated by laboratory.

Department of Ecology

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WATER QUALITY LABORATORY

DATA SUMMARY

COPIES TO:
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LAB FILES .....

Source NOOKSACK R.

Collected By G. SCOTT JEANE

Date Collected 2/20/74

Goal, Pro./Obj. _____

Log No.	Station	BOD	COD	TS	TNVS	TSS	TSNVS				
74 467	FERN STP EFF	<20	83	441	289	40	8				
491	"	<20	83	450	304	43	7				
					FC/FS						
FIRST DAY	2/20	TOTAL COLI.	FECAL COLI	FECAL STREP		SECOND DAY	2/21	TOTAL COLI	FECAL COLI		
74 480	FERN STP 0910	80*	<5	<5	<1.0	503	FERN STP 1030	11000	10*		
481	" 1100	300*	<5	15*		504	" 1200	>40 000	60		
482	" 1230	1600*	<5	10*		505	" 1300	>40000	100		
483	NOOKSACK R 1-S	950	35*	10*	3.5	506	1-S	1200	60*		
484	2-S	1600	40*	10*	4.0	507	2-S	1400	200		
485	3-S	950	40*	5*	3.0	508	3-S	1600	360		
486	4-S	1000	45*	<5	>1.0	509	4-S	710	130		
487	5-S	1800	45*	5*	1.0	510	5-S	1600	220		
488	6-S	700*	55*	5*	11.0	511	6-S	1200	110		
489	7-S	1000	65*	5*	13.0	512	7-S	500	60		
490	8-S	650*	20*	15*	1.3	513	8-S	650	20*		

Note: All results are in PPM unless otherwise specified. ND is "None Detected"

*ESTIMATED

Summary by Mary Holcomb Date 4/4/74